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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/681,093	01/02/2001	Quang Nguyen	IComm-12	8158

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EXAMINER

CHASE, SHELLY A

ART UNIT	PAPER NUMBER
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2133

6

DATE MAILED: 04/01/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary

Application No.

09/681,093

Applicant(s)

NGUYEN, QUANG

Examiner

Shelly A Chase

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 January 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-7 is/are allowed.
- 6) ☒ Claim(s) 8-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input checked="" type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>5</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1 to 17 are presented for examination.

Information Disclosure Statement

2. The references listed in the information disclosure statement submitted on 11-1-2002 have been considered by examiner (see attached PTO-1449).

Drawings

The drawings are objected to because of the problems addressed in the attached PTO-948.

Claim Objections

3. Claims 1, 4, 8 to 9, 13, 15 and 17 are objected to because of the following informalities:
 - i) claim 1, please change "the input shift register module" recited on line 8 and "the overall operations recited on line 21, to --- an input shift register module --- and --- overall operations ---,
 - ii) claim 4, please change "the write-address" to -- a write-address ---,
 - iii) claim 8, please add the proper punctuation mark,
 - iv) claim 9, please change "the overall operations" recited on line 15, to --- overall operations ---,
 - v) claims 13, 15, and 17, please delete "the" recited on line 1.Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1 to 17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. Claim 1, recites the limitations "the De-interleaver Memory" in step (b), "the De-interleaver RAM" in step (c), "the input shift register module" in step (b), and "an input shift register buffer" in step (f). The inconsistency of the claim limitations seems to render insufficient antecedent basis in the claim. Claims 2 to 3, 5 and 7 are also rejected due to their dependency on claim 1.

Claims 4 and 6, recites the limitations "the memory core," in lines 2 and 3 respectively. There is insufficient antecedent basis for this limitation in the claim.

Claim 8, recites the limitations "the received signal input," "the permuter," "the inverse-permuter." There is insufficient antecedent basis for these limitations in the claim.

Claim 9, recites the limitations "the trellis" on line 5 and "the soft decision output" on line 12. There is insufficient antecedent basis for these limitations in the claim.

Claim 16, recites the limitations "the soft decoder module" on line 1. There is insufficient antecedent basis for these limitations in the claim.

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Claims 10 to 15 and 17, recites limitations that renders insufficient antecedent basis for each claim due to their dependency on claim 7¹.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stephen et al. Yu et al. (USP 6307901 B1) in view of (USP 6484283 B2).

Claim 8:

Yu substantially teaches a turbo decoding method with a decision feedback equalizer, decoding an information sequence b_k , that was turbo encoded, the method comprising: two constituent decoders connected iteratively with an interleaver π and de-interleaver π^{-1} (see figs. 4 & 5), applying output from the interleaver to the second decoder, applying the output from the second decoder to a de-interleaver π^{-1} and applying a feedback signal from the output of the de-interleaver to the first decoder (see col. 3, lines 26 to 36).

Yu does not specifically teach the iterative decoding includes an interleaver memory and a de-interleaver memory; however, Yano in an analogous art teaches a turbo decoding method wherein an interleaver 71 includes a memory and a de-

¹ For the purpose of compact prosecution it is assumed that claims 10 to 17 are dependent on claim 9.

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interleaver 72 includes a memory for storing data with respect to the interleave and de-interleave process according to a prescribed addressing (see fig. 6 and col. 13, lines 1 to 52). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the decoding apparatus of Yu to include a interleave memory and a de-interleave memory as taught by Yano since, Yano teaches efficient turbo-decoding is achieved when a memory is used for repetitive decoding. This modification would have been obvious to one of ordinary skill in the art because one of ordinary skill in the art would have been motivated to employ a memory in a turbo-decoder for efficient turbo-decoding.

9. Claims 9 to 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jeon et al. (An efficient turbo decoder architecture for IMT2000) in view of Dr. Woodard (Implementation of high rate turbo decoders for third generation mobile communication), further in view of Haller et al. (USP 6182261 B1).

Claims 9, 12 and 17:

Jeon substantially teaches a Log2 MAP algorithm for a turbo decoder, the turbo decoder comprising: a branch metric calculator computing branch metric values, a state metric calculator computing forward and backward state metric, a log likelihood ratio calculator interpreted as "a Log-MAP module," and a state metric RAM all performing operations for turbo decoding (see pg. 302 sect. III). Jeon does not clearly teach an 8-

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state SISO decoder including a control logic state machine and the branch metric calculator computes 16 branch metric values.

However, Dr. Woodard teaches a high rate turbo decoder wherein one can select the states for a turbo decoder and a Log_2 -Map algorithm may decode an 8 state component code with a memory of either 8, 16 or 32 bits width (see pg. 12/2, sect. 2) and Haller in an analogous art teaches iterative decoding comprising a decoding processor wherein a control unit is used to control all elements of the decoding processor (see col. 9, lines 5 to 9). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the log_2 -Map algorithm of Jeon by selecting the number of states and memory width as taught by Dr. Woodard and by incorporating the control unit as taught by Haller. This modification would have been obvious to one of ordinary skill in the art because, one of ordinary skill in the art would have been motivated to employ a decoding system where the number of states may be selected for the flexibility of decoding in various environments.

As per claims 10 to 11 and 16, Jeon teaches Log_2 -MAP algorithm for soft decision (see pg. 301).

As per claims 13, and 15, Jeon teaches the branch metric calculator includes an addition operation, subtraction operation for the 2-function (see pg. 302) and the Log-likelihood ratio calculator computing for the 2 function (see pg. 303); interpreted as "the branch metric module uses a binary adder, a binary subtraction, and two binary two-complement logic."

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As per claim 14, Jeon teaches the state metric performs an addition, a subtraction, and a comparing operation (see pg. 303, sect. 2).

Allowable Subject Matter

10. Claims 1 to 7 and 9 to 17 are allowed.

11. The following is a statement of reasons for the indication of allowable subject matter: the prior art of record taken alone or in combination teaches serial and parallel turbo-decoding utilizing an iterative operation wherein the first decoder has two input form a buffer and a third input feedback from an interleaver or de-interleaver. The prior art of record also teaches turbo-decoding utilizing an interleaver memory and a de-interleaver memory as detailed above. However, the prior art of record taken alone or in combination fail to teach or fairly suggest the novelty of the instant invention.

Claim 1:

The prior art of record fail to teach or fairly suggest a turbo codes decoder used as a baseband processor subsystem for iterative decoding a plurality of sequences of received data representative of coded data generated by a turbo codes encoder from a source of original data into decoded data comprising: the first SISO Log-MAP decoder having z1 feed backing from the de-interleaver memory module, the second SISO Log-MAP decoder having an input connected to the input shift register module and its output connected to a de-interleaver memory module. Claims 1 to 7 are directly dependent on claim 1 thus these claims are allowable over the prior art made of record.

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Conclusion

12. Any response to this action should be mailed to:

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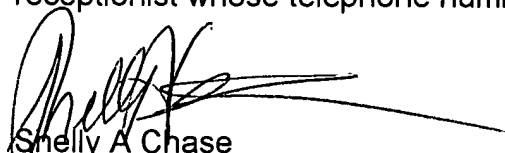
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communications)

Hand delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA.,

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shelly A Chase whose telephone number is 703-308-7246. The examiner can normally be reached on Mon-Thur from 8:00 am to 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert Decady can be reached on 703-305-9595. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-9600.


Shelly A Chase
March 18, 2003


ALBERT DECADY
SUPERVISORY PATENT EXAMINER
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